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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,782	06/11/2003	Paul Silinger	H0002233 US - 4015	2472

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EXAMINER

VAN, LUAN V

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 11/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/765,782

Applicant(s)

SILINGER ET AL.

Examiner

Luan V. Van

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Applicant's amendment of October 10, 2006 does not render the application allowable.

Status of Objections and Rejections

The objection to the drawings has been withdrawn in view of Applicant's amendment.

All rejections from the previous office action are maintained.

New grounds of rejection under 35 U.S.C. 103(a) are necessitated by the amendments.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 2, 9 and 12 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Admitted Prior Art (Fig. 1, Page 1 of applicant's disclosure).

Regarding claim 1, Admitted Prior Art teaches a plating system comprising: an elongated upper channel and an elongated lower channel (shown in Prior Art Fig. 1 of the disclosure); and a plating solution sparger 11 in Fig. 1 comprising a series of inlets oriented to direct any plating solution flowing through the inlets into one and towards another of the upper and lower channels. The plating solution inlets to the vertical spargers of Admitted Prior Art as shown in Fig. 1 are broadly interpreted to be a horizontal sparger. Moreover, it would have been obvious to one having ordinary skill in the art to have omitted the vertical spargers if uniform direct flow to the plating substrate is not desired. According to MPEP 2144.04, omission of an element and its function is obvious if the function of the element is not desired.

Regarding claim 2, Admitted Prior Art teaches the system of further comprising: an anode 14; and a substantially planar cathode 90 comprising a first surface conductive surface, a second conductive surface, and a perimeter edge, the first conductive surface and second conductive surface being substantially parallel to each other and positioned on opposite sides of the cathode; wherein the sparger 11 is positioned at least as close to the perimeter edge of the cathode as to either of the first or second conducting surface (see Fig. 1).

Regarding claim 9, Admitted Prior Art teaches the sparger is positioned horizontally and directs any plating solution flowing through the inlets into the lower channel and towards the upper channel (see Fig. 1).

Regarding claim 12, Admitted Prior Art teaches a plurality of anodes 14, positioned outside and along the length of the upper and lower channels (see Fig. 1).

Claim Rejections - 35 USC § 103

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art in view of Lace et al. (assuming Admitted Prior Art does not teach a horizontal sparger).

Regarding claim 1, Admitted Prior Art teaches a plating system comprising: an elongated upper channel and an elongated lower channel (shown in Prior Art Fig. 1 of the disclosure); and a plating solution sparger 11 in Fig. 1 comprising a series of inlets oriented to direct any plating solution flowing through the inlets into one and towards another of the upper and lower channels.

Admitted Prior Art differ from the instant claims in that the reference does not explicitly teach the horizontal sparger.

Lace et al. teach a sparger 25 comprising a plurality of inlets 48 (Fig. 5) to permit the flow of electrolyte towards the cathode in a plane substantially coplanar with the cathode 66.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Admitted Prior Art by using the horizontal sparger of Lace et al., because it would permit the substrate to receive fresh electrolyte continuously and to continuously discharge partially-spent electrolyte during cell operation, and because it would permit higher current densities to be used without adverse affect upon the plated deposit (column 2 lines 53-62 of Lace et al.).

Further, Admitted Prior Art differs from the instant claims in that the Admitted Prior Art teaches a sparger directing a plating solution flowing through the inlets towards the cathode but does not explicitly disclose the flow is in a plane substantially coplanar with the cathode (claim 3); nor the specific width of the channel dimensions (claims 8, 10, 11 and 14).

Lace et al. teach an electroplating apparatus for high-speed electroplating a cathodic strip of metal passed there through. The apparatus includes an elongated cell subdivided into a plurality of sub-cells defined by bottom and side walls and slotted partition walls for passage of the strip from one sub-cell to the next. Each sub-cell is provided with a pair of anodes, and means are provided for circulating electrolyte continuously in and through each sub-cell. (See abstract.) Lace et al. additionally teach

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a sparger 25 comprising a plurality of inlets 48 (Fig. 5) to permit the flow electrolyte towards the cathode in a plane substantially coplanar with the cathode 66.

Regarding claim 3, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the sparger of Admitted Prior Art by using the flow distributor of Lace et al. such that the flow is in a plane substantially coplanar with the cathode, because it would enable the substrate to be plated with high current densities and with high efficiency, thus resulting in a greater quantity of material, i.e. a greater length of strip, to be uniformly electroplated in unit time in an apparatus occupying the space of a larger conventional cell or, expressed another way, equivalent amounts of material can be electroplated in a cell occupying less space (column 6 lines 18-27 of Lace et al.)

Regarding claims 8, 10, 11 and 14, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have recognized that the distance between the shield and the cathode affects the degree in which the electric field lines, extending from the anode to the cathode, reach the edge of the cathode or substrate. It is known that charge buildup tends to occur at edges of the cathode substrate causing a greater concentration of material deposition to occur in these areas and thus resulting in nonuniformity of the electroplated metal on the substrate. It would have been obvious to one having ordinary skill to have modified the distance between the shield and the cathode of Admitted Prior Art through routine experimentation in order to prevent charge buildup at the cathode substrate edges and thus reducing nonuniformity in the electroplated metal. Furthermore, it would have been obvious to

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one having ordinary skill in the art at the time the invention was made to have reduced the distance between the shield and the cathode of Admitted Prior Art, because electroplating apparatus can be made to occupy less space.

Regarding claim 4, Admitted Prior Art teaches each of the upper and lower channels comprises two substantially planar and parallel non-electrically conductive sides (page 1, lines 17-18, applicant's disclosure) that are substantially parallel to the cathode; and the cathode is positioned at least partially within each of the upper and lower channels between the non electrically conductive sides (see Fig. 1).

Regarding claim 5, Admitted Prior Art teaches the upper and lower channels are positioned opposite each other and are separated from each other, the separation between the channels forming a pair of solution egress slots (see Fig. 1); and the channels are adapted to prevent current from flow between the anode and cathode other than through the egress slots (see Fig. 1).

Regarding claim 6, Admitted Prior Art teaches the egress slots are positioned approximately parallel to a center line of the cathode (see Fig. 1).

Regarding claim 7, the apparatus of Admitted Prior Art is structurally capable of plating a cathode comprising a dielectric substrate and conductive surfaces.

Regarding claim 13, Admitted Prior Art teaches the upper channel and lower channel are separated by a distance. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Admitted Prior Art by varying the distance, because it would allow substrates of different sizes to be uniformly electroplated.

Regarding claim 15, Admitted Prior Art teaches a plating system comprising: an anode 14 (Fig. 1, and page 1 of the instant disclosure), a planar cathode 90, a sparger 11, and a plurality of electrically insulating shields 13; wherein each of the plurality of shields is positioned between the anode and the cathode, and each of the plurality of shields is approximately co-planar with one of two reference planes that are substantially parallel to the cathode; and the sparger is adapted to direct plating fluid toward and edge of the cathode.

Admitted Prior Art teaches the apparatus as described above. Admitted Prior Art differs from the instant claims in that the Admitted Prior Art teaches a sparger directing a plating solution flowing through the inlets towards the cathode but does not explicitly disclose the flow is in a plane substantially coplanar with the cathode.

Lace et al. teach an electroplating apparatus for high-speed electroplating a cathodic strip of metal passed therethrough. The apparatus includes an elongated cell subdivided into a plurality of sub-cells defined by bottom and side walls and slotted partition walls for passage of the strip from one sub-cell to the next. Each sub-cell is provided with a pair of anodes, and means are provided for circulating electrolyte continuously in and through each sub-cell. (See abstract.) Lace et al. additionally teach a sparger 25 comprising a plurality of inlets 48 (Fig. 5) to permit the flow electrolyte b6towards the cathode in a plane substantially coplanar with the cathode 66.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the sparger of Admitted Prior Art by using the flow distributor of Lace et al. such that the flow is in a plane substantially coplanar with the

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cathode, because it would enable a substrate to be plated with high current densities and with high efficiency, thus resulting in a greater quantity of material, i.e. a greater length of strip, to be uniformly electroplated in unit time in an apparatus occupying the space of a larger conventional cell or, expressed another way, equivalent amounts of material can be electroplated in a cell occupying less space (column 6 lines 18-27 of Lace et al.). It would have been obvious to one having ordinary skill in the art at the time the invention was made to have further modified the apparatus of Admitted Prior Art by using the horizontal sparger of Lace et al., because it would permit the substrate to receive fresh electrolyte continuously and to continuously discharge partially-spent electrolyte during cell operation, and because it would permit higher current densities to be used without adverse affect upon the plated deposit (column 2 lines 53-62 of Lace et al.).

Response to Arguments

In the arguments presented on page 7-8 of the amendment, the applicant argues that Admitted Prior Art does not teach all of the claim elements of the present claims, particularly Admitted Prior Art does not teach a plating solution horizontal sparger comprising a series of inlets oriented to direct any plating solution flowing through the inlets into one and towards another of the upper and lower channels. However, this argument is deemed not to be persuasive, because the plating solution inlets to the vertical spargers of Admitted Prior Art as shown in Fig. 1 are broadly interpreted to be a horizontal sparger. Moreover, it would have been obvious to one having ordinary skill in

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the art to have omitted the vertical spargers if uniform direct flow to the plating substrate is not desired. According to MPEP 2144.04, omission of an element and its function is obvious if the function of the element is not desired.

Furthermore, it is conventionally known to use a horizontal sparger to permit the flow of electrolyte during an electroplating operation. For example, Lace et al. teach a sparger 25 comprising a plurality of inlets 48 (Fig. 5) to permit the flow of electrolyte towards the cathode in a plane substantially coplanar with the cathode 66. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Admitted Prior Art by using the horizontal sparger of Lace et al., because it would permit the substrate to receive fresh electrolyte continuously and to continuously discharge partially-spent electrolyte during cell operation, and because it would permit higher current densities to be used without adverse affect upon the plated deposit (column 2 lines 53-62 of Lace et al.).

Applicant's arguments have been fully considered but they are not persuasive.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

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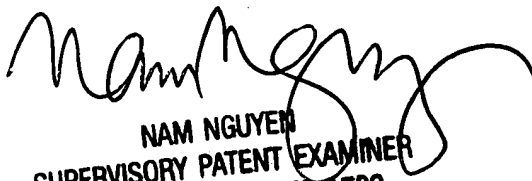
TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LWV
November 8, 2006


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